Patients receive improved orthotics and prosthetics thanks to additive manufacturing

Additive manufacturing is transforming orthotic and prosthetic manufacturing from a costly and manual operation into a streamlined digital process. Through additive manufacturing, orthotic and prosthetic suppliers will be able to provide better fitting, durable products, produced faster and at a lower cost.

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Challenges

Needing an orthotic or prosthetic product likely means a labor-intensive, time-consuming and messy process. It usually involves wet-casting plaster, manual modeling and several fittings. For manufacturers, producing well-fitting orthotic and prosthetic devices is expensive and requires highly skilled staff.

Some products are available at a standard cost, but around 75 percent are customized and cost up to €1,000 each to produce. Faced with growing demand for more complex products, though with less funding, healthcare providers are under pressure to make orthotic and prosthetic production more efficient.

These issues were all too familiar to ProReva, a leading orthotic and prosthetic manufacturer and member of Bewegingsvisie, a group of organizations in the Netherlands dedicated to improving orthotic and prosthetic care.

Arjan Kremer, Finance & ICT Manager at ProReva, says, “How do we, or anyone in orthotic and prosthetic healthcare, manage increasing demand but still maintain standards and improve quality with tighter budgets?”

Solution

As DSM investigated how additive manufacturing might help improve orthotic and prosthetic production, the team quickly realized it needed help from several partners to develop a comprehensive digital workflow solution, helping ProReva switch from traditional to full digital production of orthotics and prosthetics.

That integrated process starts with ProReva who works with healthcare providers to assess needs and electronically scan a patient’s injured limb to capture measurements and features needed for 3D printing.

Software company Twikit has developed an application, TwikFit®, that translates scan data and patient needs to production-ready CAD files.

Twikit founder and CEO Martijn Joris says, “The TwikFit® cloud-based SaaS application bridges the gap between patient and product manufacture, cutting out several manual steps. The software integrates product design and engineering expertise with a user-friendly interface. It removes the complexity of CAD and allows non-technical orthotic and prosthetic professionals to maximize skills to customize and build high-quality digital models that are production ready.”

Devices designed using TwikFit® are printed with DSM filament materials on Ultimaker 3D printers. Peter Overgaauw, Ultimaker’s Lead Application Engineer says, “The Ultimaker 3D printer portfolio can be scaled easily to produce different types and sizes of product and runs DSM filament materials that are available on the market.”

From DSM’s filament portfolio, the team selected Novamid® ID1030 CF10, a strong and stiff material ideal for structural build, in combination with Arnitel® ID2045, a soft and flexible, though resistant material. This is ideal for the inner, softer part of the device that touches the skin as it passed relevant regulatory approvals for irritation and cytotoxicity.
Benefits

The result of the collaboration between ProReva, Twikit, Ultimaker and DSM is a comprehensive digital solution, enabling practitioners to offer better, faster care and provide custom, personalized orthotic and prosthetic devices to patients.

Patients can expect less of a wait to receive their device, fewer fittings and enhanced durability. The personalized orthotic and prosthetic items give patients better comfort and fit, resulting in improved healing time.

Switching to digital manufacturing removed several steps required in traditional manufacturing, reducing production time from two weeks to three days, as well as cutting costs by up to 30 percent. Some products can even be produced the same day as initial consultation. Orthotic and prosthetic manufacturers will be less reliant on expensive and scarce skills because features such as the easy-to-use TwikFit® application automates many modeling steps.

Digital manufacturing also replaces messy casting processes and provides a cleaner environment for staff. The variety and scope of Ultimaker printers and DSM materials means the solution can be applied to a wide range of orthotic and prosthetic product types and production environments.

This orthotic and prosthetic ecosystem demonstrates how DSM forms partnerships to accelerate the adoption of additive manufacturing by creating comprehensive solutions that benefit customers and, in this case, improve patient care.